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REGULATORY AMENDMENT

TO THE

REEF FISH FISHERY MANAGEMENT PLAN

TO SET 1997 COMMERCIAL RED SNAPPER SEASON

AND

AUTHORIZE RECREATIONAL QUOTA CLOSURES

*(Includes Environmental Assessment,
and Regulatory Impact Review)*

MARCH 1997



Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 331
5401 West Kennedy Boulevard
Tampa, Florida 33609

813-228-2815

This is a publication of the Gulf of Mexico Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award No. NA77FC0001.

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Abbreviations Used in This Document

ABC	Allowable Biological Catch
EEZ	Exclusive Economic Zone
F	Rate of instantaneous fishing mortality
FMP	Fishery Management Plan
GMFMC	Gulf of Mexico Fishery Management Council
M	Rate of instantaneous natural mortality
NMFS	National Marine Fisheries Service
OY	Optimum Yield
Plan	Reef Fish FMP for the Gulf of Mexico
RA	Regional Administrator (NMFS Southeast Regional Office) (formerly Regional Director)
RFA	Regulatory Flexibility Act of 1980
RFSAP	Reef Fish Scientific Assessment Panel
RIR	Regulatory Impact Review
RSAP	Red snapper Advisory Panel
SEFC or SEFSC	Southeast Fisheries Center, Miami, Florida (NMFS Southeast Regional Office)
SEP	Socio-economic Panel
SPR	Spawning Potential Ratio
SSBR	Spawning Stock Biomass Ratio (an older term for SPR)
TAC	Total Allowable Catch
YPR	Yield Per Recruit

1. INTRODUCTION

The red snapper resource in the Gulf of Mexico is in an overfished condition, and is under a management program to restore the stock to a level above the overfished threshold of 20 percent spawning potential ratio (SPR) within a specified time frame. The time frame, under the provisions of the Reef Fish FMP, can be no longer than one and a half generation times, where a generation time is the average time it would take a year class in an unfished population to replace itself. The estimate of generation time has changed as knowledge of red snapper biology has improved, and it currently is estimated to be 19.6 years, resulting in a maximum recovery time of 29.4 years. The recovery plan, which began in 1989, therefore has recovery target date of the year 2019.

During the recovery program, red snapper stock assessments or assessment updates are conducted on an annual basis. Based on these assessments, a Reef Fish Stock Assessment Panel recommends to the Council a range of Allowable Biological Catch (ABC) which is intended to keep the recovery on schedule to meet its objective, depending upon the level of risk that the Council chooses to accept (i.e., harvest at the upper level of ABC has a greater risk of not achieving the recovery goal than harvest at the lower levels). The Council selects a level of Total Allowable Catch (TAC) from within the ABC range, along with any changes to fishing regulations (size limits, bag and trip limits, closed seasons, etc.) that are needed to achieve the TAC. The TAC is a level of fishing intended to obtain Optimum Yield and to prevent overfishing, or to follow a recovery plan when a stock is overfished. Annual changes to TAC or measures to attain TAC are implemented through a Regulatory Amendment.

Regulatory amendments differ from a plan amendments in that they are used to set TACs and associated fishing regulations, whereas plan amendments are used to make changes in the basic policies and procedures defined in a fishery management plan. A regulatory amendment is limited in its scope and follows a specific procedure which is described later in this document.

This regulatory amendment proposes no changes to the level of red snapper TAC for 1997 (9.12 million pounds), but it does propose changes to 1) more effectively implement the commercial portion of the TAC by changing the time of the commercial second season opening and implementing periodic closures, and 2) comply with new provisions of the Magnuson-Stevens Fishery Conservation and Management Act regarding implementation of recreational red snapper quotas.

2. HISTORY OF REGULATORY ACTION

This section contains a history of only those management measures that have been implemented in the reef fish fishery by regulatory amendment, using the framework procedure for setting total allowable catch (TAC). For a complete history of management, refer to the most recent plan amendment.

During 1991 several regulatory amendments were implemented to adjust the TACs and quotas for reef fish:

A 1991 regulatory amendment raised the 1991 quota for shallow-water groupers to 9.9¹ million pounds. This action was taken to provide the commercial fishery an opportunity to harvest 0.7 million pounds that went unharvested in 1990 due to an early closure of the fishery in 1990. NMFS had projected the 9.2 million pound quota to be reached on November 7, but subsequent data showed that the actual harvest was 8.5 million pounds.

A 1991 regulatory amendment set the red snapper TAC at 4.0 million pounds to be allocated with a commercial quota of 2.04 million pounds and a 7 fish recreational daily bag limit (1.96 million pound allocation) beginning in 1991. This amendment also contained a proposal by the Council to effect a 50 percent reduction of red snapper bycatch in 1994 by the offshore EEZ shrimp trawler fleet, to occur through the mandatory use of finfish excluder devices on shrimp trawls, reductions in fishing effort, area or season closures of the shrimp fishery, or a combination of these actions. This combination of measures was projected to achieve a 20 percent SPR by the year 2007. The 2.04 million pound quota was reached on August 24, 1991, and the red snapper fishery was closed to further commercial harvest in the EEZ for the remainder of the year. In 1992, the commercial red snapper quota remained at 2.04 million pounds. However, extremely heavy harvest rates resulted in the quota being filled in just 53 days, and the commercial red snapper fishery was closed on February 22, 1992.

A 1991 regulatory amendment set the 1992 commercial quota for shallow-water groupers at 9.8 million pounds, which was 1.6 million pounds higher than the adjusted 1991 base level quota of 8.2 million pounds.

A 1992 regulatory amendment set the 1993 red snapper TAC at 6.0 million pounds to be allocated with a commercial quota of 3.06 million pounds and a recreational allocation of 2.94 million pounds (to be implemented by a 7 fish recreational daily bag limit). The amendment also changed the target year to achieve a 20 percent red snapper SPR from 2007 to 2009, based on the Plan provision that the rebuilding period may be for a time span not exceeding 1.5 times the potential generation time of the stock and an estimated red snapper generation time of 13 years (Goodyear 1992).

A proposed 1993 regulatory amendment that would have moved the longline and buoy gear restricted area boundary off central and south-central Florida inshore from the 20 fathom isobath to the 15 fathom isobath for a one-year period beginning January 1, 1994 was withdrawn by the Council in January 1994. This regulatory amendment had been proposed as an experimental fishery during which time studies would be carried out to examine the biological, social and economic impacts of the action. The action was proposed in response to requests from longline fishermen for increased access to areas with suitable grouper habitat, and in consideration of a red grouper stock assessment which indicated that species was not overfished and that the commercial quota had never been filled. The Council withdrew the proposal amid concerns that it would lead to a quota closure and a concern by the NMFS Southeast Fisheries Science Center that there were inadequate experimental controls to properly evaluate the impact of the action.

A 1993 regulatory amendment set the opening date of the 1994 commercial red snapper fishery as February 10, 1994, and restricted commercial vessels to landing no more than one trip limit per day. The purpose of this amendment was to facilitate enforcement of the trip limits, minimize fishing during

¹ The corrected 1991 quota, using the revised conversion factor, was 8.8 million pounds. The corrected 1990 actual harvest was 7.6 million pounds.

hazardous winter weather, and ensure that the commercial red snapper fishery is open during Lent, when there is increased demand for seafood. The Total Allowable Catch (TAC) was retained at the 1993 level of 6 million pounds, with a 3.06 million pound commercial quota and 2.94 million pound recreational allocation. The shallow water grouper was also evaluated and was retained at its status quo level of 15.1 million pounds (9.8 million pound commercial quota) and 20 inch total length size limit for gag, red, Nassau, yellowfin and black grouper.

An October 1994 regulatory amendment retained the 6 million pound red snapper TAC and commercial trip limits and set the opening date of the 1995 commercial red snapper fishery as February 24, 1995. However, because the recreational sector exceeded its 2.94 million pound red snapper allocation each year since 1992, this regulatory amendment reduced the daily bag limit from 7 fish to 5 fish, and increased the minimum size limit for recreational fishing from 14 inches to 15 inches.

A proposed December 1994 regulatory amendment would have reduced the minimum size limit for red grouper from 20 inches to 18 inches for both recreational and commercial fishermen. This change was proposed because the commercial shallow water grouper quota was not being filled even though the red grouper stock assessment indicated that the status of the stock was well above the overfishing threshold. NMFS held the proposed amendment in abeyance due to concerns that its impact on the recreational fishery had not been evaluated, and that there was a possibility that the recreational allocation would be exceeded. Subsequent analysis of the impact of an 18 inch red grouper size limit on the recreational harvest indicated that it might result in the recreational sector exceeding its grouper allocation. The Council submitted a revised regulatory amendment in March 1995 to reduce the red grouper size limit to 18 inches for the commercial fishery only. However, prior to submission of the revised regulatory amendment, the NMFS/SEFSC reported that it had discovered a bias in the red grouper growth rate data. As a result, the status of the stock could not be precisely determined, and it could only be stated that the stocks were most likely in or above the range of 20 percent to 52 percent SPR. NMFS rejected the proposed amendment because there was a possibility that the stock might be right at the 20 percent overfishing threshold. Under NMFS's policy of risk aversion in the face of uncertainty, NMFS felt that there was an unacceptable risk of overfishing with the proposed rule. Further evaluation of red grouper growth rates reduced that uncertainty to the point where the status of red grouper stocks was determined to be most likely at or above 27 percent SPR, well above the overfishing threshold. Based on this new information, the Council submitted a second revised regulatory amendment in September 1995 to reduce the commercial red grouper size limit to 18 inches. That second revision was rejected by NMFS because of concerns that it would create undue user conflicts between commercial and recreational fishermen, result in long-term economic losses to commercial fishermen, and allow the taking of juvenile red grouper between 18-20 inches, contrary to the FMP Amendment 3, Objective 8, which provides for protection of juveniles.

A December 1995 regulatory amendment increased the red snapper TAC to 9.12 million pounds and extended the recovery date to the year 2019, based on new biological information that increased the generation time estimate to 19.6 years. The RFSAP had recommended an ABC range of 6 to 10 million pounds, but warned that, at the upper level of ABC, failure to achieve shrimp trawl bycatch reduction or keep the recreational sector within its allocation could result in possibly dramatic reductions in future ABC range. The Council decided on a TAC of 9.12 million pounds because it was more conservative than the upper range of ABC and at a level that was likely to successfully constrain the recreational fishery.

3. PURPOSE AND NEED FOR ACTION

The 1996 regulatory amendment to set red snapper total allowable catch created a split commercial season for 1996 and 1997. The first part of the season was set to open on February 1 and close when 3.06 million pounds of red snapper was harvested, and the second part of the season was set to open on September 15 and close when the remainder of the quota was taken. In 1995, the second part of the season was open for just 22 days. This short duration created difficulties for fishermen because of bad weather and reduced demand for red snapper during late September. Consequently, industry representatives asked that the starting date for the second season be moved up to the beginning of September. However, they asked that the opening day be set for September 2 rather than September 1 to avoid conflicts with the recreational sector during Labor Day weekend. They also suggested that the starting time on opening day be changed from 12:01 a.m. to 12:00 noon in order to make it easier for enforcement agents to spot vessels illegally fishing before the season opens.

The Magnuson-Stevens Fishery Conservation and Management Act was revised and reauthorized by Congress on October 11, 1996 through the Sustainable Fisheries Act of 1996. Section 407(d) of the revised Act states:

(d) CATCH LIMITS.--Any fishery management plan, plan amendment, or regulation submitted by the Gulf Council for the red snapper fishery after the date of enactment of the Sustainable Fisheries Act shall contain conservation and management measures that--

- (1) establish separate quotas for recreational fishing (which, for the purposes of this subsection shall include charter fishing) and commercial fishing that, when reached, result in a prohibition on the retention of fish caught during recreational fishing and commercial fishing, respectively, for the remainder of the fishing year; and
- (2) ensure that such quotas reflect allocations among such sectors and do not reflect any harvests in excess of such allocations.

This amendment contains the regulatory language to provide the Regional Administrator with the authority to comply with the above requirement.

4. PROPOSED ACTIONS

The second portion of the 1997 commercial red snapper season will open on September 2 at noon and will close on September 15 at noon. Thereafter, the commercial fishery will open on the first day of each month at noon and will close on the fifteenth day of each month at noon or when the 1997 commercial red snapper quota is taken.

The recreational red snapper allocation of TAC shall be considered to be a quota, and the Regional Administrator is authorized to close the recreational fishery in the EEZ, i.e., reduce the bag limit to zero, through notice action at such time as projected to be necessary to prevent the recreational sector from exceeding its allocation for the remainder of the fishing year.

5. MANAGEMENT OBJECTIVE AND OPTIMUM YIELD

Optimum Yield

(Note: The Council has proposed, through resubmission of a rejected Amendment 11 proposal, a revision of the Optimum Yield definition that would set the biological component of OY at 30 percent SPR. This revision is presently in the process of being submitted to NMFS. Until it is implemented, the following is the existing definition of OY.)

The primary objective and definition of Optimum Yield (OY) for the Reef Fish Fishery Management Plan is any harvest level which maintains, or is expected to maintain, over time a survival rate of biomass into the stock of spawning age to achieve at least a 20 percent spawning potential ratio (SPR).

Definition of Overfishing

The following is the definition of overfishing contained in Amendment 1 of the Reef Fish Fishery Management Plan (FMP).

1. A reef fish stock or stock complex is overfished when it is below the level of 20 percent SPR.
2. When a reef fish stock or stock complex is overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 20 percent SPR level.
3. When a reef fish stock or stock complex is not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that would not at least allow a harvest of optimum yield on a continuing basis.

6. REEF FISH FRAMEWORK PROCEDURE FOR SPECIFICATION OF TAC

The following is the framework procedure for specification of TAC, as established in Amendment 1 and modified in Amendment 11. The specified recovery date for red snapper has been modified to reflect the recovery date adopted in the 1996 regulatory amendment to set red snapper TAC.

Procedure for Specification of TAC:

1. Prior to October 1 each year, or such other time as agreed upon by the Council and RA, the NMFS Southeast Fisheries Science Center (SEFSC) and Economics and Trade Division (ETD), Southeast Regional Office (SERO) will: a) update or complete biological and economic assessments and analyses of the present and future condition of the stocks and fisheries for red snapper and other reef fish stocks or stock complexes; b) assess to the extent possible the current SPR levels for each stock; c) estimate fishing mortality (F) in relation to $F_{20 \text{ percent SPR}}$ and F_{OY} ; d) estimate annual surplus production, F_{\max} or other population parameters deemed appropriate; e) summarize statistics on the fishery for each stock or stock complex; f) specify the geographical

variations in stock abundance, mortality, recruitment, and age of entry into the fishery for each stock or stock complex; and g) provide information for analyzing social and economic impacts of any specification demanding adjustments of allocations, quotas, bag limits or other fishing restrictions.

2. The Council will convene a Scientific Reef Fish Stock Assessment Panel (RFSAP), and a Socioeconomic Assessment Panel (SEP) appointed by the Council, that will, as working groups, review the SEFSC and ETD assessments, current harvest statistics, economic, social, and other relevant data. The RFSAP will prepare a written report to the Council specifying a range of ABC for each stock or stock complex which is in need of catch restrictions for attaining or maintaining OY. The ABCs are catch ranges that will be calculated for those species in the management unit that have been identified by the Council, NMFS, or the working panels as in need of catch restrictions for attaining or maintaining OY. For overfished stocks, the range of ABCs shall be calculated so as to achieve reef fish population levels at or above the 20 percent SPR goal by January 1, 2000, for all reef fish except red snapper which has a January 2019 target date, or by a time period (target date), or set of time periods (target dates) specified by the RFSAP. Any time period specified by the stock assessment panel for consideration by the Council under this framework procedure cannot exceed a period equal to 1.5 times the potential generation time of the stock or such other time period as specified by plan amendment. Generation times are to be specified by the stock assessment panel based on the biological characteristics of the individual stocks. For stock or stock complexes where data in the SEFSC reports are inadequate to compute an ABC based on the spawning stock biomass per recruit or SPR models, the RFSAP will use other available information as a guide in providing their best estimate of an ABC range that should result in at least a 20 percent SPR level. The ABC ranges will be established to prevent an overfished stock from further decline. To the extent possible, a risk analysis should be conducted indicating the probabilities of attaining or exceeding the stock goal of 20 percent SPR, the annual transitional yields (i.e., catch streams) calculated for each level of fishing mortality within the ABC range. The SEP will examine the economic and social impacts associated with fishing restrictions required to attain those levels. The working groups reports may include recommendations on bag limits, size limits, specific gear limits, season closures, and other restrictions required to attain management goals, along with the economic and social impacts of such restrictions, and the research and data collection necessary to improve the assessments. The RFSAP may also recommend additional species for future analyses.
3. The Council will conduct a public hearing on the RFSAP and SEP reports at, or prior, to the time it is considered by the Council for action. Other public hearings may be held also. The Council will request review of the reports by its Reef Fish Advisory Panel and Scientific and Statistical Committees and may convene these groups before taking action.
4. The Council in selecting a TAC level, and a stock restoration time period (target date), if necessary, for each stock or stock complex for which an ABC range has been identified will, in addition to taking into consideration the recommendations and information provided for in (1), (2), and (3), utilize the following criteria:
 - a. Set TAC within or below the first ABC range or set a series of annual TACs to obtain the ABC level within the first three years or less.

- b. Subdivide the TACs into commercial and recreational allocations which maximize the net benefits of the fishery to the nation. The allocations will be based on historical percentages harvested by each user group during the base period of 1979-1987. However, if for an overfished stock the harvest in any year exceeds the TAC due to either the recreational or commercial user group exceeding its allocation, subsequent allocations pertaining to the respective user group will be adjusted to assure meeting the specified target date for achieving the spawning potential ratio (SPR) goal.
5. The Council will provide its recommendations to the RA for any specifications in TACs and stock restoration target dates for each stock or stock complex, and the quotas, bag limits, trip limits, size limits, closed seasons, and gear restrictions necessary to attain the TAC, along with the reports, a regulatory impact review and environmental assessment of impacts, and the proposed regulations before October 15, or such other time as agreed upon by the Council and RA.
6. Prior to each fishing year, or other such time as agreed upon by the RA and Council, the RA will review the Council's recommendations and supporting information; and, if he concurs that the recommendations are consistent with the objectives of the FMP, the Magnuson Act National Standards, and other applicable law, he shall forward for publication notice of proposed rules for TACs and associated harvest restrictions by November 1, or such other time as agreed upon by the Council and RA (providing up to 30 days for additional public comment). The RA will take into consideration all public comment and information received and will forward for publication in the Federal Register the notice of final rule by December 1, or such other time as agreed upon by the Council and RA.
7. Appropriate regulatory changes that may be implemented by proposed rule in the Federal Register include:
 - a. The TACs for each stock or stock complex that are designed to achieve a specific level of ABC within the first year, or annual levels of TAC designed to achieve the ABC level within three years.
 - b. Bag limits, size limits, vessel trip limits, closed seasons or areas, gear restrictions, and quotas designed to achieve the TAC level.
 - c. The time period (target date) specified for rebuilding an overfished stock with the restriction that a time period specified under this framework procedure cannot exceed a period equal to 1.5 times the generation time of the stock under consideration.
8. If the NMFS decides not to publish the proposed rule of the recommended management measures, or to otherwise hold the measures in abeyance, then the Regional Administrator must notify the Council of his intended action within 30 days of receipt of the Council's proposal and the reasons for NMFS concern along with suggested changes to the proposed management measures that would alleviate the concerns. Such notice shall specify: 1) the applicable law with which the amendment is inconsistent, 2) the nature of such inconsistencies, and 3) recommendations concerning the actions that could be taken by the Council to conform the amendment to the requirements of applicable law.

7. WHAT IS SPAWNING POTENTIAL RATIO (SPR)?

Spawning potential ratio is an index of a population's health as measured by the biological ability of the adult fish to produce spawn or eggs. A particular estimated level of SPR is directly dependent on the estimated number of living adult fish (or females), and their longevity or number at age, which is controlled by the prevailing fishing mortality exerted on the population. This biological spawning ability can be measured in terms of total adult fish biomass (number alive x average weight), gonad biomass (number alive x average gonad weight), or eggs produced (number alive x average number of eggs spawned) for each age class of fish.

A generation of fish in a population must on average produce the same number of adult fish in the next generation for a population to persist without decline or, in other words, be in equilibrium. All populations of animals attempt to attain levels of equilibrium, however environmental fluctuations prevent this from happening in most cases. Fishing reduces the number of adults surviving from a given number of recruits by reducing their life expectancy. To prevent population collapse the egg to recruit survival probability and/or the fecundities of the survivors must rise in response to the fishing induced lowered abundance of adults (Goodyear 1989). Clearly, the above population mechanisms allow a population to be harvested without damaging its biological potential. However, as harvest pressure grows (fishing mortality increases), a point is reached where the population loses more fish through harvesting than it can replenish, and overfishing occurs. A population can also exist at an equilibrium level below its optimum level and can increase in size if fishing mortality is reduced.

Various measures of optimal fishing have been defined whereby fishing greater than the optimal level results in overfishing. The concepts of maximum sustainable yield (MSY) and maximum yield per recruit (YPR) are the two most common measures of optimal fishing. For reasons set forth in Amendment 1, the measure of optimal fishing for reef fish was chosen to be 20 percent SPR, which in a YPR context results in management advice similar to that needed to achieve maximum YPR.

Calculation of SPR is similar to calculation of YPR, except, instead of attempting to maximize yield from a year class of fish, achieving a certain level of spawning potential is attempted. This spawning potential is estimated as the fraction or ratio of spawning ability of the species when being fished divided by the spawning ability of the species under conditions of no fishing mortality; i.e., only natural mortality occurs. The SPR of a population is then controlled by the fishing mortality exerted on each age class of fish.

The SPR estimate can be calculated as either a *transitional* or *static* SPR:

Transitional SPR is used to determine if a stock is currently in an overfished status. It provides information about the status of the stock at a point in time, but it does not provide any indication of whether a stock is declining, recovering, or remaining stable.

Static SPR is used to determine if a stock is being fished at a rate that will eventually lead to an overfished status. When a stock is in the process of declining or recovering, this is the level at which a stock will eventually stabilize if the fishing rate remains at its current level.

8. STATUS OF RED SNAPPER STOCK

In 1996 there was an update of red snapper harvest in the Gulf of Mexico (Goodyear 1996), but no new stock assessment analysis. From the 1995 stock assessment, based on:

- An improved growth rate estimate
- A reduced natural mortality rate estimate (from $M=0.20$ to $M=0.10$)
- Increased longevity/generation time estimates (from 42/13.6 years to 53/19.6 years)
- Incorporation of reductions in shrimp trawl bycatch mortality for 1993 and 1994 (5.8% and 10%)
- Reduced estimate of recreational release mortality (from 33 percent to 20 percent)

The RFSAP recommended a 1996 ABC range of 6 to 10 million pounds, but warned that TACs at the upper end of this range may need to be reduced in the future if shrimp trawl bycatch reductions are not implemented in 1997, or if the recreational sector is not constrained to its allocation. The Council subsequently set the 1996 red snapper TAC at 9.12 million pounds.

Harvest Trends

Commercial: Gulf of Mexico red snapper harvested by U.S. fishermen are primarily caught in the northern Gulf from Panama City, Florida to Galveston, Texas. The fishery is primarily prosecuted in federal waters, offshore, and outside of state waters. The greatest part of the present commercial and recreational harvest is directly south and to the west of the Mississippi River.

In the commercial red snapper fishery the primary gear types used are manually operated handlines or power assisted lines (bandit rigs). Landings from these gears are reported under a single gear code for handlines. Other gear types used to harvest red snapper include bottom longlines, buoy lines and fish traps, although total landings of red snapper from fish traps have been small.

The commercial harvest since 1990 is shown in the table below and by gear type in Figure 1 (handlines includes power reels and bandit rigs). The commercial quota was initially 3.1 MP in 1990 and was subsequently set at 51 percent of TAC when adjustments were made. For 1995, the commercial harvest was estimated to be slightly below the 3.06 million pound quota as of the close of the fishing season on April 14. However, at the Council's request, the commercial season was reopened for 36 hours on November 1-2, 1995 to allow the commercial sector an opportunity to harvest the remaining 0.16 MP of the 1995 3.06 MP quota. Preliminary estimates are that, with inclusion of the November mini-season, the commercial sector will have met or slightly exceeded its allocation.

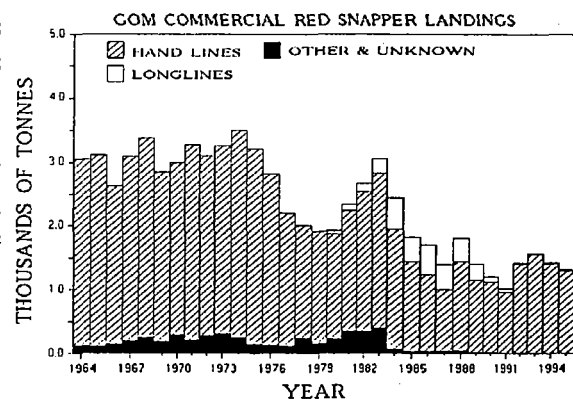


Figure 2. Commercial landings of red snapper from U.S. waters of the Gulf of Mexico.

Year	Commercial Quota	Commercial Harvest	Days Open ("+" = split season)
1990	3.1 MP	2.66 MP	365
1991	2.04 MP	2.23 MP	236
1992	2.04 MP plus emergency season	3.14 MP	52 + 42
1993	3.06 MP	3.45 MP	104
1994	3.06 MP	3.12 MP	78
1995	3.06 MP	2.95 MP	50 + 2
1996	4.65 MP	4.48 MP (preliminary)	64 + 22

RED SNAPPER CPUE FROM REEF-FISH LOGBOOKS

CATCH PER DAY (KG)

DEPARTURE WEEK

1990 1991 1992 1993 1994 1995

Figure 3. Red snapper catch per day fished by week for trips where red snapper exceeded half the total finfish landings.

Recreational: Recreational red snapper harvest allocations since 1991 have been set at 49 percent of the TAC, or 1.96 MP in 1991 and 1992, 2.94 MP from 1993 to 1995, and 4.47 MP in 1996. Actual recreational

harvests in pounds of red snapper have exceeded the allocation in every year. However, the 1995 recreational harvest, though higher than the 1995 allocation, was 6 percent below the increased 1996 allocation. Recreational landings have been decreasing since 1993, possibly due to increased size limits and a decreasing impact from the strong 1989 year class.

RECREATIONAL RED SNAPPER HARVEST

Year	Recreational Allocation	Recreational Harvest
1990	No allocation was explicitly specified	1.28 MP
1991	1.96 MP	2.08 MP
1992	1.96 MP	3.71 MP
1993	2.94 MP	5.91 MP
1994	2.94 MP	5.24 MP
1995	2.94 MP	4.18 MP
1996	4.47	not available

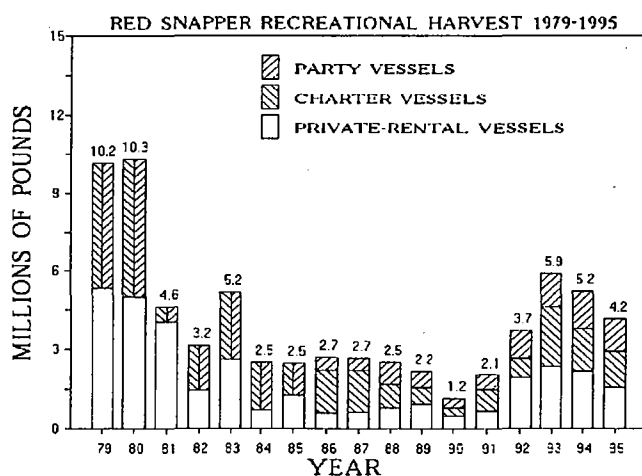


Figure 4. U.S. Gulf of Mexico recreational harvest of red snapper in weight of fish by mode of fishing.

Overall Harvest: The Council established TAC levels of 4 MP in 1991 and 1992, and 6 million pounds in 1993. In 1996, the Council increased the TAC to 9.12 million pounds. Total directed fishery harvests during 1990 through 1995 are listed in the table below.

OVERALL RED SNAPPER HARVEST

Year	TAC	Total Directed Harvest
1990	No TAC was explicitly specified	3.94 MP
1991	4.0 MP	4.31 MP
1992	4.0 MP plus emergency season	6.85 MP
1993	6.0 MP	9.36 MP
1994	6.0 MP	8.36 MP
1995	6.0 MP	7.13 MP

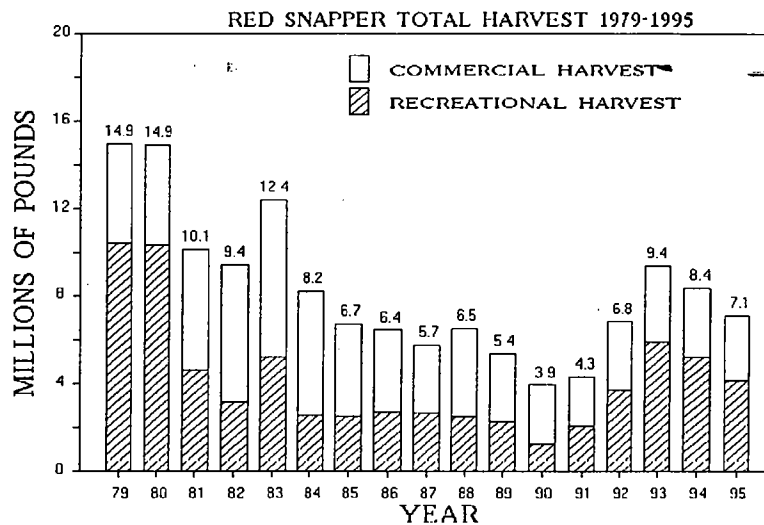


Figure 5. Combined U.S. Gulf of Mexico commercial and recreational harvest of red snapper in weight.

These harvest levels reflect adjustments that have been made to the MRFSS recreational estimates. Recreational red snapper harvest allocations since 1991 have been set at 49 percent of the TAC.

Spawning Potential Ratio (SPR) Estimates and ABC Range

There was no new SPR analysis for 1996. In the 1995 stock assessment, using a revised estimate of natural mortality ($M=0.10$), the SPR was estimated to have been about 0.6% of the unfished level, essentially

unchanged from 1984 (Figure 5). The RFSAP noted that this change in SPR (relative to the estimates under $M=0.20$) is simply a rescaling of the recovery parameters along with extension of the target date to 2019, and does not represent a dramatic decrease in the perceived health of the stock. Under the assumptions that 1) actual shrimp trawl bycatch mortalities are not higher in 1995 and 1996 than projected, 2) the recreational sector stays within its allocation, 3) a 50 percent reduction in shrimp trawl bycatch mortality is implemented in 1997, and 4) projected increases in recruitment are realized, the RFSAP in 1995 recommended an ABC range of 6 million to 10 million pounds of red snapper. However, the RFSAP also warned that failure to meet these conditions can result in possibly dramatic reductions in future ABC ranges.

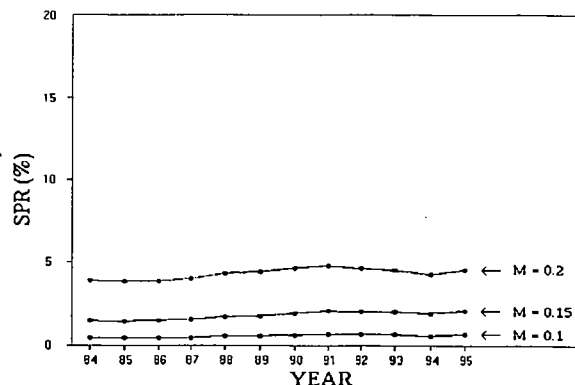


Figure 6. Estimates of dynamic SPR for 1984-1995 for three levels of post-bycatch natural mortality.

9. CHARACTERIZATION OF THE FISHERY AND PARTICIPANT GROUPS

General Description

The fishery for red snapper is composed of a shrimp trawl bycatch of age-0 and age-1 fish, a commercial fishery managed by quota since 1990, a for hire recreational fishery and private recreational anglers. Since the advent of TAC and allocations in the fishery, its history can be described as one of attenuated seasons and depressed prices for the food commercial sector and overruns of allocation by the recreational sectors. The reaction by the Council has been the implementation of an effort management system for the food commercial sector, the establishment of a permit system for the for-hire recreational fishery and the accelerated implementation of increased minimum sizes on red snapper for the anglers.

As mentioned elsewhere, the statutory allocation of TAC is 51 percent commercial and 49 percent recreational, but the actual landing percentages in the directed fishery over the last three years averaged at 41 percent commercial and 59 percent recreational.

Recreational and For-Hire Sectors

Recreational landings have been identified from three survey sources: Texas Parks and Wildlife, NMFS-Headboat and NMFS-MRFSS. All three surveys reflect an increasing trend in landings over the years, although the last three years reflect a declining trend. Figure 10 displays the relative contribution to recreational catch by state using these sources. Even during this short time frame the shift in state shares of the recreational landings, notably the recovery of landings by Florida and the growth of Louisiana and Alabama, is evident.

Figure 10. Gulf of Mexico red snapper landings by state, 1986-1995

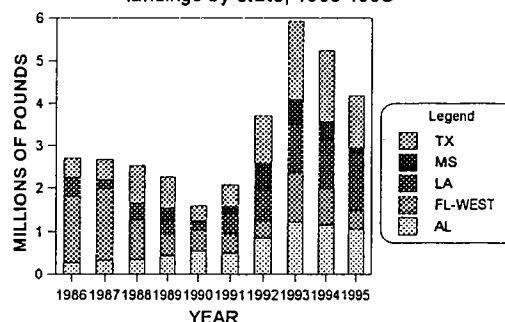


Figure 11. Gulf of Mexico recreational landings by mode, 1986-1995

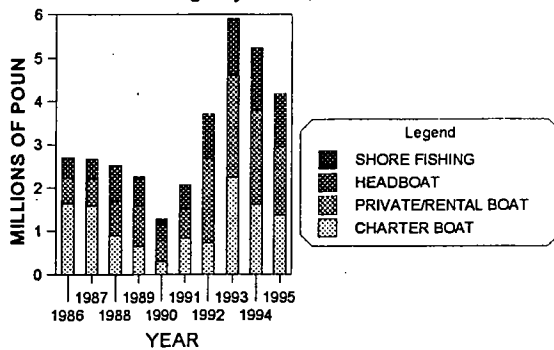


Figure 11 displays landings by mode for the period 1986 to 1995. The landings in the charter mode have a bimodal distribution with highs during 1986 and 1993; the private boat and headboat modes suggest a trend of growing catches. Noticeable here is the relative share of the charterboat fleet and of the for-hire sector generally. The estimation of landings for the charter boat mode is controversial because of the reanalysis of the 1993 and 1994 data. NMFS-MRFSS staff concluded that those years

were correct estimates while 1990-92 were possibly underestimates. It is worth noting that the approach taken by the stock assessment was to average those years and therefore to detrend the 1993 and 1994 data for a 1994 estimate of 4.7 MP. A year or so ago, preliminary partial-year landings data received by the Council indicated 1995 landings from MRFSS were 24 percent lower than those in 1994 and 1995 headboat landings 16 to 32 percent lower than those in 1994 (Holiman and Dixon, pers. comm. 1995). Current information indicates that the 1995 recreational harvests were about 20 percent below those of 1994, and headboat landings were about 13 percent below those of 1994. Lower landings in 1995 could be attributed to the imposition of a higher size limit and bad weather, as suggested in a public testimony before the Council.

Per MRFSS records only, the number of recreational anglers in the Gulf of Mexico averaged at 1.87 million annually for the period 1990-1994. These anglers took 16.9 million trips annually for the same period. Figures 12 through 15 present some information on angler trips in which red snapper was targeted (target trips) or caught (catch trips). In Figure 12, note the trends in red snapper target trips by state between 1988 and 1995: 1) there was little perceptible effect on target trips after the implementation of Amendment 1 to the reef fish FMP; 2) Louisiana anglers increased trips by roughly 20 percent when the last three years are compared to the prior five years; 3) Alabama anglers experienced a doubling of trips between 1991 and 1992 which has persisted and increased; 4) Mississippi anglers mimicked the trend in Alabama.

Figure 12. Red snapper recreational target trips, by state, 1988-95

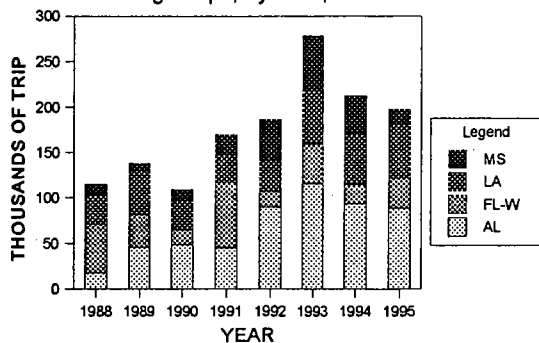


Figure 13 displays angler trips in which red snapper was caught, whether or not red snapper was targeted. The catch trips correlated well with the target trips, although not so much in terms of magnitudes of changes. In Alabama, for example, the catch trips increased and decreased in the same direction as the target trips. But the doubling of target trips between 1991 and 1992 was accompanied by only a slight increase in catch trips. Catch trips in this state nonetheless picked up in later years. Florida's proportion of catch trips is larger than the state's proportion in target trips while the opposite seems to be the case for Mississippi.

Figure 13. Red snapper recreational catch trips, by state, 1988-1995

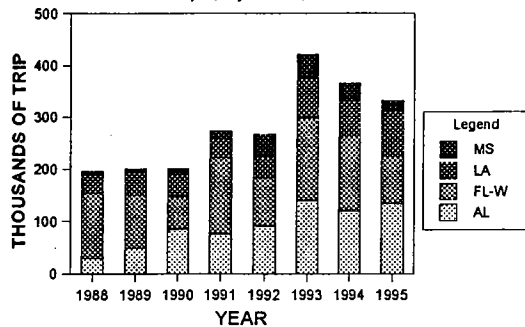
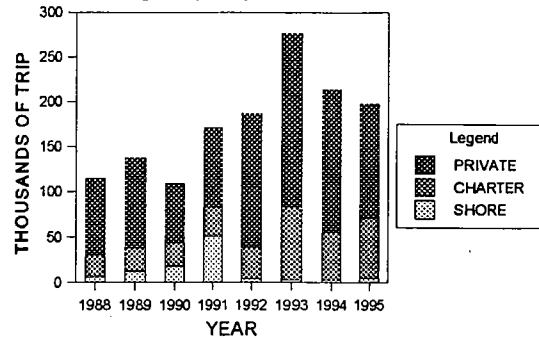


Figure 14. Red snapper recreational target trips, by mode, 1988-1995



Figures 14 and 15 break down the recreational target and catch trips into shore, charter and private boat trips. The shore mode comprises a minimal portion of both total target and catch trips. The charter boat mode indicates a steady increasing trend in both target trips (Figure 14) and catch trips (Figure 15). The private mode has dominated the target trips. The same can be said of the catch trips, except in 1993, 1994, and 1995 when the charter boat mode had higher proportional share of total catch trips. Figure 15 appears to bear out the growing importance of the charter boat mode in accounting for recreational catches of red snapper.

Figure 15. Red snapper recreational catch trips, by mode, 1988-1995

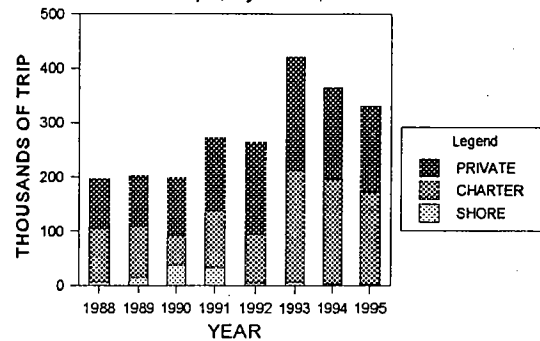
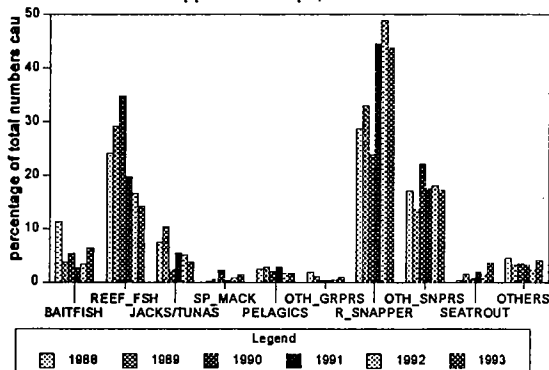


Figure 16. Gulf catch composition of red snapper catch trips, 1988 - 1993



While target and catch trips can give some information about future catch, catch composition suggests some of the species effects of further regulation of anglers and the for-hire sector. Figure 16 illustrates the catch composition of red snapper catch trips, i.e., trips catching red snapper whether or not red snapper was targeted. This figure appears to imply that the composition of species caught together with red snapper has remained relatively stable. Among the various species caught, there also appears to be no trend as to which species are caught as regulations are changed on the red snapper fishery.

Commercial Sector

Red snappers are mainly caught and landed in the northern and western Gulf (including Texas to Bay County, Florida). Commercial landings of reef fishes in this area declined from over 15 MP in 1964 (a good portion of which was from Mexican waters) to a low of 5.5 MP in 1978. Landings recovered during the late 1970s, and have averaged 9.0 million pounds (whole weight) per year between 1981 and 1994 with a range of 6.5 million pounds (in 1991) to 11.0 million pounds (in 1988) (Figure 17). However, the species composition of the catch changed markedly. Landings of red snapper declined from approximately 12.2 million pounds in 1964 to 2.2

Figure 17. Commercial landings of reef fishes along the northern and western Gulf

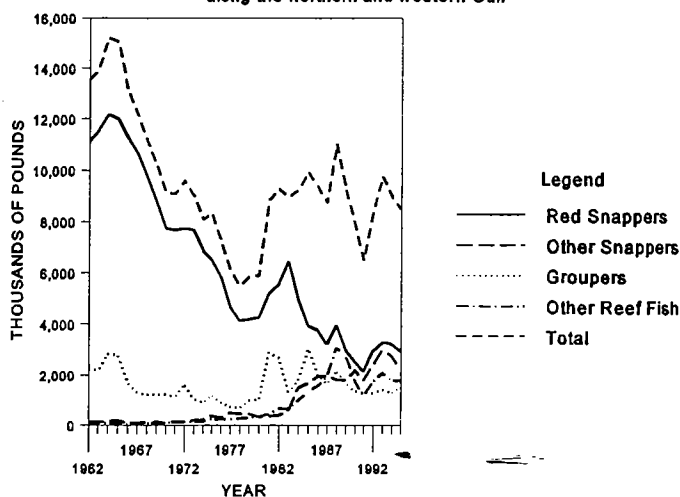
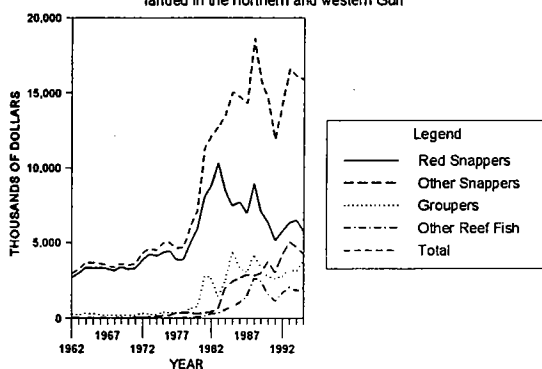


Figure 18. Ex-vessel value of reef fish landed in the northern and western Gulf

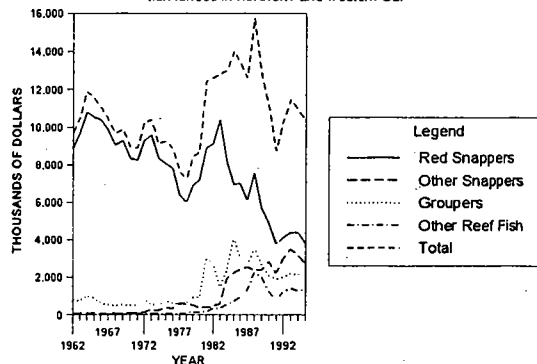


1991, and then increased to \$15.8 million in 1995 (Figure 18). Much of the increase prior to 1988 was due to inflation, as measured by the consumer price index for all items and all urban consumers (CPI-U, with a 1982-1984 base period). After adjusting for inflation, total ex-vessel value tended to mirror the trend in landings (compare Figures 17 and 19). Real ex-vessel value remained relatively constant from 1981 through 1987, peaked in 1988,

million pounds in 1991, the first year of management with quotas. Red snapper now compose the vast majority of the catch on red snapper trips. Red snapper represented 35% of the total commercial catch of reef fishes in 1995 compared to 72% of the catch in 1980 and 85% in 1970.

Ex-vessel value received by commercial reef fishermen in the northern and western Gulf of Mexico increased from \$2.9 million in 1962 to \$18.6 million in 1988, declined to \$11.9 million in

Figure 19. Real ex-vessel value of reef fish landed in northern and western Gulf



and then declined. The real ex-vessel revenues received in 1991 and 1992 were the lowest since 1980 (Figure 19).

Commercial fishermen in the northern and western Gulf received \$5.8 million from red snapper in 1995. Historically, red snapper has been the most valuable species in the fishery, but its relative importance has declined (Figures 17 and 19). In 1995, red snapper contributed 36% to overall value received, whereas it contributed 83% in 1980 and 93% in 1970. Red snapper prices generally rose more quickly than the general price level prior to the derby fishery. Since then, however, red snapper prices have declined markedly and monthly price fluctuations are large.

Reef Fish Commercial Permits

The permit data file identifies vessels with permits to fish for reef fishes in Federal waters of the Gulf of Mexico. The data indicate a decline from 2,366 in 1993 to 1,693 in 1996. The reason for the decline is unknown, but it is presumed that vessels which were only marginally active or not active at all in the reef fish fishery have not chosen or have not been able to have the permits renewed. When the red snapper endorsement system took effect in 1993, 131 vessels qualified for the endorsement which allowed them to harvest up to 2,000 pounds per day trip. The rest of red snapper fishermen were allowed a 200 pound limit per day trip.

An economic survey was conducted in the fall of 1994 and spring of 1995 by interviewers in face-to-face meetings with owners or operators of randomly selected vessels. The questionnaire primarily asked fishermen about their fishing histories, their capital investments in vessel and equipment, and about their average catches, revenues, and costs per trip for their two most important fishing activities for reef fishes during the 1993 calendar year.

Standard statistical procedures were used to estimate the total number of trips for red snapper, as well as landings, revenues and trip costs. It was estimated that a total of nearly 3.7 million pounds of red snapper worth \$7.4 million were landed on 4,328 trips. Fishermen on high-volume boats with vertical hook-and-line gear accounted for nearly 62% of total landings and ex-vessel revenues of red snapper. Fishermen spent nearly \$2.2 million for routine trip costs such as fuel, ice, bait, food and minor gear replacement and repair. These estimated costs exclude fixed costs and payments to owner, captain and crew.

10. MANAGEMENT ALTERNATIVES AND REGULATORY IMPACT REVIEW

Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action, 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem, and 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866 and whether the proposed regulations will

have a "significant economic impact on a substantial number of small entities" in compliance with the Regulatory Flexibility Act of 1980 (RFA). The primary purpose of the RFA is to relieve small businesses, small organizations, and small governmental jurisdictions (collectively: "small entities") of burdensome regulatory and recordkeeping requirements. The RFA requires that if regulatory and recordkeeping requirements are not burdensome, then the head of a Federal agency must certify that the requirement, if promulgated, will not have a significant effect on a substantial number of small entities.

This RIR analyzes the probable impacts that the proposed alternatives for the Reef Fish Fishery Management Plan (FMP) would have on the commercial and recreational directed red snapper fisheries. In this document, the "Economic Impacts" statements under each of the management options comprise the bulk of the RIR. The problems and objectives are described in previous sections of this regulatory document as a part of the RIR by reference.

Proposed Alternatives

Proposed Alternative 1. The second portion of the 1997 commercial red snapper season will open on September 2 at noon and will close on September 15 at noon. Thereafter, the commercial fishery will open on the first day of each month at noon and will close on the fifteenth day of each month at noon or when the 1997 commercial red snapper quota is taken.

Proposed Alternative 2. The recreational red snapper allocation of TAC shall be considered to be a quota, and the Regional Administrator is authorized to close the recreational fishery in the EEZ, i.e., reduce the bag limit to zero, through notice action at such time as projected to be necessary to prevent the recreational sector from exceeding its allocation for the remainder of the fishing year.

Rationale: Opening the commercial red snapper fishery on September 2 instead of September 15 will allow the fishery to begin during a period when there is less likely to be bad weather which might prevent smaller vessels from participating. It also avoids conflicts with the recreational sector during Labor Day weekend. Setting the opening and closing times at noon instead of 12:01 a.m. allows openings and closings to occur during daylight hours, making it for difficult for fishermen to fish during closed periods immediately preceding and following the open season. Splitting the commercial opening into the first two weeks of each month will help to extend the season. In 1996, the second commercial season lasted 22 days. Thus, this proposal should allow the September opening to last into October.

The action to establish a recreational red snapper quota and authorize the Regional Administrator to close the recreational season when the quota is reached is required under the Magnuson-Stevens Act. Recreational harvest has exceeded its allocation in every year for which landings information is available. However, in recent years, recreational harvest has been declining as reductions in bag limits and increased size limits have been implemented. The most recent year's recreational landings (4.18 million pounds in 1995) is less than the current 4.47 million pound allocation. If the trend in recreational landings continues, recreational quota closures may not be needed in the immediate future, but will likely be required in the future as the red snapper stock and average size increases.

Biological Impacts: The TAC is unchanged and remains at the level of 9.12 million pounds, which was implemented in 1996. This TAC is projected to allow the red snapper stock to recover to 20 percent SPR by

the year 2019, provided that; 1) actual shrimp trawl bycatch mortalities are not higher in 1995 and 1996 than projected, 2) the recreational sector stays within its allocation, 3) a 50 percent reduction in shrimp trawl bycatch mortality is implemented in 1997, and 4) projected increases in recruitment are realized.

Advancing the opening date from September 15 to September 2 is unlikely to have any significant biological impact. Part of the rationale for creating a split commercial season was to assure that the entire commercial harvest was not taken prior to spawning season. Peak spawning season is June to August. Some spawning continues into September, but at reduced levels of activity.

The two week per month split of the commercial season will produce monthly pulse fishing and create a series of mini-derbies, with increased landings on each opening day. This could result in fewer actual fishing days. In a study on optimal harvesting policy, Takenaka and Matsuda (in review) examined bimodal (twice per year) pulse fishing and concluded that this strategy is unlikely to achieve maximum sustainable yield when fishing mortality is directed toward fish older than the age of first capture.

The effect of establishing a recreational quota and authorizing the Regional Administrator to implement recreational quota closures depends upon the effectiveness of other management measures to control harvest rates and the ability of NMFS to accurately monitor and project recreational harvest. If bag limits, size limits, or other measures are effective in keeping the recreational sector within its allocation, then quota closures will not take place. If these other measures do not adequately constrain recreational harvest, as has happened in past years, then effective quota monitoring and closures will aid in keeping harvest within the TAC needed for the recovery program. However, NMFS has not yet developed a method for monitoring a recreational red snapper quota. If recreational harvest cannot be effectively monitored, then this provision will have no biological impact.

Economic Impacts: The 1997 TAC of 9.12 MP, allocated between commercial and recreational fishermen according to a 51/49 ratio, is the same as that of last year. In 1996, the commercial quota of 4.65 MP was divided between two seasons: 3.01 MP for the first season, which opened on February 1 and the remainder for the second season, which opened on September 15. The first season lasted 64 days and the second, 22 days.

Without the current proposal, a similar split season applies for the current year, with the first season being opened on February 1 with a 3.01 MP quota, and the second is supposed to start on September 15. Under the **Proposed Alternative 1**, the second season would start on September 2 with the remainder of the quota. In addition, the second season is proposed to be split further. The first closing date would be September 15; thereafter the fishery would open for the first 15 days of the month until the quota is filled. Also proposed is a change in the specific time for opening and closing the fishery to noon time from the current practice of one minute after midnight.

A split season has been expected to mitigate the adverse impacts of a derby fishery that has developed in the commercial red snapper fishery since the imposition of stringent quotas. At the harvest level, these impacts pertain to the changes in revenues and costs brought about by bunching landings over a very short period of time. For this short period, ex-vessel prices tended to be depressed (as one might expect from an inflexible demand function), thus adversely impinging on vessel revenues. This can be illustrated by examining the changes in ex-vessel prices over time.

Waters (1996a) reported the monthly prices of red snapper over the period 1978-1995. In January 1992, the Gulfwide average ex-vessel price per pound was \$1.98. This was substantially lower than the corresponding prices of \$2.30 for 1984-1989 and \$2.76 for 1990-1991. The picture remained the same for the other open months although the price differences were not as substantial. Average prices for February 1992-1995, March 1993-1995, April 1993-1995, and May 1993 were, respectively \$2.14, \$2.13, \$2.24, and \$2.26. The corresponding prices for 1984-1989 were: February - \$2.26, March - \$2.33, April - 2.31, and May - \$2.23. Price differences, however, were larger when the period for comparison is 1990-1991: February - \$2.90, March - \$2.97, April - \$2.99, and May - \$2.87. While total revenues may not have actually declined in later years considering the fact that commercial quota has been increased, the mentioned price differences do indicate that some revenues, not inconsequential in amount, must have been forgone by the fishing vessels.

During the short open season, fishing costs may have also increased, or at least the probability of an increase in cost has been relatively high. This could be brought about by a variety of factors. Vessel crew work on a more continuous fashion over the short season; vessels and equipment are worked more intensively, with less time devoted to maintenance before every trip; fuel, ice, bait, and other accessories are purchased with relatively less timing flexibility to take advantage of fluctuating prices; and, fishing is undertaken even during less than favorable weather conditions.

With the type of changes in revenues and costs described above, vessel profitability in particular and industry profitability in general would tend to fall. Taking into account again the increase in quota, profits may not have actually fallen, but certainly some profits have been forgone. A split season could mitigate the adverse changes in costs and revenues, but if it simply replicates the type of changes described above, its impact on overall vessel and industry profitability would still be negative. The 1996 experience could have been used to verify the effects of a split season, but the necessary information has not yet been assembled. At any rate, a previous RIR (see GMFMC, 1996) analyzing the then proposed 1996 split season concluded that it could result at least in a revenue increase by as much as \$380 thousand, although a good part of this revenue increase could be reduced by the presence of imports. While changes in costs could not be quantified, it was contended that fishing costs would not materially differ between the then status quo and split season. Thus, it was concluded that the revenue increase would also translate in a profit increase.

A complicating feature introduced by the current proposal is the further subdivision of the second season. It is worth recalling here the previous advice of the Socioeconomic Panel (1992). They indicated that spreading the red snapper season over a longer period (as what would happen under a split season) would result in higher economic and social benefits. At the same time, they cautioned that having mini-derbies as a way of lengthening the fishing season would also result in less economic benefits.

The second season of the 1996 fishing year which opened on September 15 lasted 22 days. About 500 thousand pounds were taken in the first week, another 500 thousand pounds in the second week, and the rest in the subsequent week. Preliminary logbook reports indicate there were 88, 90, and 70 endorsed vessels that had red snapper landings in the first, second, and third week, respectively, of the second season. The corresponding number of non-endorsed vessels with red snapper landings in the first, second, and third week of the second season, respectively, were 58, 61, and 29. More than 95 percent of the landings for each of the three weeks was made by endorsed vessels. Noting this landings scenario, it appears that the proposed further split of the second season would not materially lengthen the red snapper season. In fact, a shorter season may be expected if the September 2 opening provides more favorable weather, especially to smaller vessels. In particular most, if not all of the 126 endorsed vessels, would be able to participate, and this would merely accelerate the harvest of the red snapper quota. What would happen in the process is a surge in landings in

the first few days of the opening, thus bringing about several mini-derbies and their consequent adverse impacts on prices and possibly costs.

We may conclude from the foregoing discussion that Proposed Alternative 1 is unlikely to result in an increase in net benefits to the commercial sector of the fishery.

Proposed Alternative 2 would directly impact both recreational anglers and the for-hire sector of the recreational fishery. Unlike its commercial counterpart, the recreational sector has not been subjected to closure. Instead bag and size limits have been the major tools used to keep this sector within its allocation. Since 1991, the recreational sector has been exceeding its allocation, initially by about 7 percent in 1991, 16 percent in 1992, 84 percent in 1993, 60 percent in 1994, and 42 percent in 1995. Due to these overages, additional restrictions on the recreational sector have been suggested. This need was echoed by the SEP in its 1993 report when it became known that the recreational sector did not appear to be constrained enough by the bag and size limit (see GMFMC, 1993). A year later the Council decided to reduce the recreational bag limit from 7 to 5 fish and increase the size limit from 14 to 15 inches for the 1995 season. It may be noted, however, that constraining the recreational sector within its allocation (and the commercial sector within its quota) presupposes that the long-term benefits from restrictive management could outweigh short-run losses or short-run forgone benefits.

Holiman (1995b) conducted a size and bag limit analysis on the recreational sector. His projections indicated that the present limits of 5 fish and 15 inches would result in a 4.47 MP harvest in 1996. Complete recreational landings information for 1996 are not available yet, but preliminary indications are the recreational allocation would not be reached (Holiman, 1996). It may be noted here that, in addition to maintaining the 5 fish and 15 inches limits, recreational allocation was increased in 1996 via an increase in TAC. Such increase equated the recreational allocation to about the projected 1996 harvest.

Despite recreational overages in previous years, the trend appears to be a decline in recreational harvest from the 1993 peak level. Figures 10 and 11 illustrate this declining trend. Size and bag limits, as well as weather conditions, could have contributed to the decline. This declining trend is corroborated by declining effort as depicted in Figures 12 and 13. Both target and catch trips have decreased since 1993. While there is no way of telling whether this effort decline would continue into the future, levels below the 1993 peak may be expected in the near future. A recreational quota and a threat of a closure have different effects on the recreational sector than on the commercial sector, primarily because of differences in motivations for taking the trips. Unlike commercial fishermen, recreational anglers take fishing trips for a variety of reasons other than catching red snapper. The motivation then to compete with other anglers in partaking of the recreational quota is not as strong a driving force as with commercial fishermen. Over the short-run then the proposed closure of the recreational fishery may not occur, and thus may be deemed to have minimal impact on the recreational sector. Even where closure happens, catch and release practice may still be used, and this could partly mitigate the short-term adverse impacts of a closure.

Over a longer time, we can expect effort to increase due to increases in population and income levels, at the least. It may be pointed out that even without these increases, the ability to reach the recreational quota already exists as experienced in 1993 when both target and catch trips (and harvests) were relatively high. In the event of a fishery closure, the immediate impacts would befall on for-hire vessels that depend heavily on red snapper for selling trips. The actual amount of loss cannot be quantified.

While closure of the recreational fishery would bring about immediate reductions in benefits to the fishery, the long-term effects of maintaining the stocks on the path to its recovery would be beneficial. Whether or not these beneficial effects would be maintained in the future depends not only on the recovery of the stock but also on the type of management adopted for the recreational red snapper fishery. Bag and size limits, including fishery-wide closure, are basically open access type of controls. One irony about bag and size limits (and closure) is that as the stock recovers, fishing success increases, and this in turn would tend to invite more effort into the fishery. With increased abundance and effort, more stringent bag and size limits would have to be imposed or else the season would be open on a gradually shortened period. Another negative feature of an open access management regime is that resource rents are not apt to be "generated", since the resource is not appropriately priced when used as an input in the production process.

In response to this eventuality, the SEP (GMFMC, 1994) suggested that a long run approach, other than bag and size limits, may need to be developed. Noting also the trend in catches by anglers in private and charter boat mode that indicates the growing importance of the charter boat mode, the SEP (GMFMC, 1995) recommended that the Council formally recognize the reef fishery in general and red snapper in particular as being composed of three distinct sectors: commercial for food, for-hire recreational and private recreational. This recommendation was based on the observation that the three sectors are motivated by different sets of economic and social factors and that different management regimes for the three sectors should result in a higher level of economic and social benefits for any particular level of total harvest. Specific additional recommendations related to this general recommendation include: 1) setting a control date for entry to the for-hire sector, 2) formulating specific options to control overall effort in the for-hire and private recreational sectors, and 3) requesting that the Regional Director of NMFS begin an economic and social research program that will provide information for Council decisions regarding effective management of the recreational sectors.

Rejected Alternatives

RED SNAPPER COMMERCIAL SEASON

Rejected Alternative: Status Quo. Retain a September 15, 12:01 a.m. opening for the second season, with the season to remain open continuously until the quota is filled.

RECREATIONAL QUOTA CLOSURE

Rejected Alternative: Link the authorization for a recreational quota closure with a provision to reduce the bag limit (or implement some other management measure) if, during the season, it appears that the recreational sector is going to fill its quota.

Note: Status quo is not included as a rejected alternative to the recreational quota closure because the Magnuson-Stevens Act requires that action be taken in the first plan, plan amendment or regulatory action affecting red snapper, and it does not permit status quo.

Rationale: The September 15 opening in 1996 was a compromise between fishermen, who preferred a September 1 opening to take advantage of better weather conditions, and fish buyers, who preferred an October 1 opening to take advantage of higher demand for seafood later in the year. In 1996, the September 15 opening coincided with the Jewish religious holidays of Rosh Hashanah and Yom Kippur, which seafood buyers felt resulted in decreased demand, especially in the New York area. In 1997, these holidays occur in October.

However, fishermen reported that weather conditions begin to deteriorate in September, and that an early September opening is preferable to mid-September. For this reason, status quo for the commercial season opening was rejected.

The Council considered linking the authority of the Regional Administrator to invoke a recreational quota closure to provisions that would implement reduced bag limits or other measures during the season if it appeared that the sector was going to reach its quota. Additional provisions, however, would complicate the proposed action and make it less clear that the proposed alternative complies with the requirement of the Magnuson-Stevens Act. Uncertainty about how accurately NMFS could monitor a recreational quota raised questions about whether additional provisions could be effectively and fairly implemented. As a result, the Council felt that the proposed alternative, which is simple and straightforward, was the best approach to take at this time.

Biological Impacts: The rejected alternatives would have no biological impact on the resource.

Economic Impacts: Maintaining the status quo for the commercial fishery has basically no impacts on fishing participants. In the discussion of impacts of Proposed Alternative 1, it was concluded that the benefits derived therefrom are unlikely to differ materially from those of the status quo.

As an alternative to outright closure, in-season reduction of bag limits would allow year round recreational fishing (harvest) of red snapper. Among others, this would allow continuous operation of for-hire vessels for targeting red snapper. The benefit scenario for both recreational anglers and for-hire vessels would be relatively higher under this alternative than under the closure alternative. As regards for-hire vessels, selling trips with lower bag limits may be expected to be more successful than selling trips with only catch and release experience. As regards individual anglers, it is possible that benefits from catch and release may be relatively high for some anglers, but benefits from keeping fish may still be considered higher for anglers in general.

It is indeed true that it will be difficult for the Regional Administrator to forecast the exact time bag limits may be reduced in order to constrain the recreational sector to its quota, the same difficulty is still very much attendant to the closure alternative. In fact, a closure may impose more burden in terms of accurately forecasting when the recreational quota will be reached. On the other hand, enforcing a closure may be less costly than enforcing variable bag limits within the season. However, as experience is accumulated, the difficulty of enforcing variable bag limits may not differ significantly from that of enforcing a closure. This, of course, presupposes that over time, the change in bag limits would become more predictable. For example, if experience shows that on a certain period, a certain percentage of the quota is harvested on a consistent basis, the bag limit reduction may be instituted well ahead of time. This is possible for red snapper since the current bag limit of 5 fish is relatively high, and reducing it to, say, 3 or 2 could bring about a substantial reduction in harvest. Undoubtedly, this reduction can be expected mainly in areas where bag limits, or close to the bag limits, are oftentimes caught.

In sum, the variable bag limit alternative may generate higher net benefits than outright closure of the recreational red snapper fishery. While this is the case, there remains the issue as to whether a variable bag limit approach is in compliance with the Magnuson-Stevens Act of quota closure in the recreational fishery. One way to resolve this issue is to incorporate explicitly in the variable bag limit provision the option to reduce bag limit to zero, if the quota is expected to be reached before the normal end of the fishing season, i.e., December 31. A zero bag limit is certainly one of the possible bag limit under the variable bag limit rule. Determination of the precise time to impose a zero bag limit is met with about the same difficulty as the closure

alternative. Considering, however, that the reduction to zero bag limit starts from an already lowered bag limit, the potential to exceed the recreational allocation is less likely than under the closure alternative.

Private and Public Costs

The preparation, implementation, enforcement and monitoring of this or any federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. Costs associated with this specific action include:

Council costs of document preparation, meetings, public hearings, and information dissemination.....	\$25,000
NMFS administrative costs of document preparation, meetings and review.....	\$ 16,000
Law enforcement costs.....	\$ none
Public burden associated with permits.....	\$ none
NMFS costs associated with permits.....	\$ none
TOTAL.....	\$41,000

The Council and Federal costs of document preparation are based on staff time, travel, printing and any other relevant items where funds were expended directly for this specific action. The proposed measures are not expected to incur additional enforcement cost and permit cost of significant amount to either the public or NMFS.

Summary and Net Impact of Proposed Action

The proposed regulatory action constitutes changes in management for red snapper in the EEZ under the jurisdiction of the Gulf Council. The emphasis of the summary is on the expected economic impact of the proposed alternatives.

Proposed Alternative 1 is expected to result in minimal impacts on the commercial sector. There is some possibility that further splitting the second season for commercial red snapper would bring about some of the adverse impacts expected of a derby fishery, since the proposed alternative may be expected to create mini-derbies in the process of lengthening of the season.

Proposed Alternative 2 is expected to have minimal impacts on the recreational fishery over the short run. In the long-run, the impacts of closure may become significant especially as abundance and effort increases over time.

The proposed regulatory action is estimated to cost the Federal government \$41,000. The proposed measures are not expected to incur additional enforcement cost and permit cost of significant amount to either the public or NMFS.

Determination of a Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: a) an annual effect on the economy of \$100 million or more; b) a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; or c) significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

The entire commercial red snapper fishery had an ex-vessel value of about \$5.8 million in 1995 (Waters, 1996a). There is currently no adequate measure of the recreational red snapper fishery impacted by the proposed regulation, but the estimated impacts of the proposed regulation are relatively small relative to the \$100 million a year benchmark. Thus, given the size of the fishery and the segment of the fishery directly affected by the proposed regulation, it is concluded that any revenue or cost impacts on the fishery would be significantly less than \$100 million annually.

Since the commercial quota is maintained and merely spread out over a possibly longer, there is no expected major increases in revenues and profits to the commercial sector. Commercial cost of fishing operation remains largely unaffected. Prices to consumers are also not expected to increase with a further split of the second season for red snapper. Over the short-run the recreational for-hire sector remains unaffected considering the unlikely event of meeting its quota and the fishery being closed by the Regional Administrator. Over the long-run, closures may be effected especially as abundance of the red snapper stock and fishing effort. As can be gleaned from the cost estimates, there are no major increases in cost to the Federal, State, or local government agencies. In fact the cost incurred by these agencies are only those that are directly related to the formulation of the proposed regulation. Since the proposed regulation has no material adverse effects on the commercial and for-hire sectors, any of the sub-items under item (c) above would not apply.

Based on the foregoing, it is concluded that this regulation if enacted would not constitute a "significant regulatory action" under any of the criteria enumerated above.

Initial Regulatory Flexibility Analysis

Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to relieve small businesses, small organizations, and small governmental entities from burdensome regulations and record keeping requirements. The category of small entities likely to be affected by the proposed plan amendment is that of commercial and for-hire businesses currently engaged in the reef fish fishery. The impacts of the proposed action on these entities have been discussed above. The following discussion of impacts focuses specifically on the consequences of the proposed action on the mentioned business entities. An Initial Regulatory Flexibility Analysis (IRFA) is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." In addition to analyses conducted for the Regulatory Impact Review (RIR), the IRFA provides an estimate of the number of small businesses affected, a description of the small businesses affected, and a discussion of the nature and size of the impacts.

The Regulatory Flexibility Act requires a determination as to whether or not a proposed rule has a significant impact on a substantial number of small entities. If the rule does have this impact then an Initial Regulatory Flexibility Analysis (IRFA) has to be completed for public comment. The IRFA becomes final after the public comments have been addressed. If the proposed rule does not meet the criteria for "substantial number" and "significant impact," then a certification to this effect must be prepared.

All of the commercial reef fish harvesting entities and for-hire vessels targeting red snapper affected by the rule will qualify as small business entities because their gross revenues are less than \$3 million annually for commercial vessels and \$5 million annually for-hire vessels. Hence, it is clear that the criterion of a substantial number of the small business entities comprising the commercial reef fish harvesting industry being affected by the proposed rule will be met. The outcome of "significant impact" is less clear but can be triggered by any of the five conditions or criteria discussed below.

The regulations are likely to result in a change in annual gross revenues by more than 5 percent. The proposed alternative to further split the second red snapper season is not expected to increase commercial vessel revenues. Revenues could even fall if mini-derbies occur. In any event, the effects would be less than the 5 percent threshold. Over the short-run, no closure of the recreational fishery is expected. Over the long-run, closures could materialize and would effect major changes in the revenue and profit structure of for-hire vessels. These changes could potentially exceed the 5 percent threshold.

Annual compliance costs (annualized capital, operating, reporting, etc.) increase total costs of production for small entities by more than 5 percent. The public burden to comply with the provisions of this amendment has been estimated to be practically nil as no additional permits or gear modifications are required.

Compliance costs as a percent of sales for small entities are at least 10 percent higher than compliance costs as a percent of sales for large entities. All the firms expected to be impacted by the rule are small entities and hence there is no differential impact.

Capital costs of compliance represent a significant portion of capital available to small entities, considering internal cash flow and external financing capabilities. General information available as to the ability of small business fishing firms to finance items such as a switch to new gear or new species or new fishing areas indicate that this would be a problem for at least some of the firms. The evidence is that the banking community is becoming increasingly reluctant to finance changes of this type, especially if the firm has a history of cash flow problems. To the extent, however, that the major change in the commercial sector is mainly a lengthening of the season (as intended), no additional capital costs may be expected. In the event of closure in the recreational fishery, for-hire vessels may be forced to substitute other reef fish or fish in other areas. However, this condition is not expected to force for-hire vessels to incur major capital

The requirements of the regulation are likely to result in a number of the small entities affected being forced to cease business operations. This number is not precisely defined by SBA but a "rule of thumb" to trigger this criterion would be two percent of the small entities affected. The accompanying RIR indicates that the action to split further the second red snapper season would not force any vessels out of the fishery. Closure in the recreational red snapper fishery may force for-hire vessels to change fishing practices, but it is not anticipated that such change would too burdensome to compel vessels to cease operation entirely.

Considering all the criteria discussed above, the conclusion is that small businesses in the for-hire sector of the red snapper fishery will be significantly affected by the proposed rule. Hence, the determination is made that

the proposed rule will have a significant economic impact on a substantial number of small business entities and an Initial Regulatory Flexibility Analysis (IRFA) is required.

The full details of the economic analysis conducted for the proposed rule are contained in the RIR and some of the relevant results are summarized for the purposes of the IRFA.

Description of the reasons why action by the agency is being considered: The need and purpose of this action are set forth in the section on Purpose and Need for Action.

Statement of the objectives of, and legal basis for, the proposed rule: Refer to the section on Management Objectives and Optimum Yield. The Magnuson-Stevens Fishery Conservation and Management Act of 1976 provides the legal basis for the rule.

Description and estimate of the number of small entities to which the proposed rule will apply: The proposed rule will apply to all of the 1,818 commercial reef fish harvesting firms that currently hold permits to fish in the Gulf of Mexico. According to a recent survey (Waters, 1996b), on average these small firms typically operate fishing vessels that have a length of 38 feet, have a current estimated resale value of \$52,817, provide \$52,000 in gross sales of reef fish and other species, and produce a net income of \$12,000. There are about 838 charter vessels and 92 party boats operating in the Gulf.

Description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records: The reporting, recordkeeping and other compliance requirements of the proposed rule are not materially different from the current practice.

Identification of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule: No duplicative, overlapping or conflicting Federal rules have been identified.

Description of significant alternatives to the proposed rule and discussion of how the alternatives attempt to minimize economic impacts on small entities: Several types alternatives have been considered as ways to meet the FMP objectives. The status quo for the recreational fishery is not considered a viable alternative since it does not comply with the Magnuson-Stevens Act regarding management of the recreational red snapper fishery.

11. ENVIRONMENTAL ASSESSMENT

Environmental Consequences

Physical and Human Environment: The proposed change in the commercial second season opening and 14 day per month split should allow red snapper harvest to be more spread out and provide more stability in price and market availability during the Fall. It will also allow fishermen an additional opportunity to fish if bad weather, equipment problems or other factors prevent them from fishing during a 14 day segment. The recreational quota closure introduces an element of uncertainty in the recreational fishing season since participants will be uncertain if and when the recreational fishery will close. In the commercial sector, this uncertainty resulted in a derby fishery, as fishermen rushed to catch red snapper before the season closed. The impact of this uncertainty on the recreational sector cannot be determined at this time.

Fishery Resource: The proposed change in the commercial second season will have no significant impact on fishery resources. The recreational quota closure provision may help to better constrain red snapper harvest within TAC, depending upon NMFS's ability to accurately monitor the recreational harvest and project quota closures. Should a quota closure be implemented, the recreational fishery could see an effort shifting to other species for the remainder of the fishing year, and in subsequent years, the possibility of a recreational derby fishery exists if fishermen schedule more trips for early in the year to avoid being impacted by the quota closure. Such rescheduling could result in increased red snapper fishing mortality before and during spawning season, which would have a negative impact on the rebuilding program.

Effect on Endangered Species and Marine Mammals: The NOAA will conduct a consultation under Section 7 of the Endangered Species Act. A consultation was previously conducted regarding the impact of Amendment 1 which included the framework measures under which this action is being taken. A biological opinion resulting from that consultation found that neither the directed fisheries nor the proposed action jeopardize the recovery of endangered or threatened species or their critical habitat.

Effect on Wetlands: The proposed action will have no effect on flood plains, wetlands, or rivers.

Mitigating Measures: No mitigating measures related to the proposed action are necessary because there are no harmful impacts to the environment.

Unavoidable Adverse Affects: Because the recreational quota closure provision is required under the Magnuson-Stevens Act, the potential adverse impacts on the human environment and fishery resources described above are unavoidable.

Irreversible and irretrievable commitments of resources: There are no irreversible commitments of resources caused by implementation of this amendment.

Finding of No Significant Environmental Impact

The proposed amendment is not a major action having significant impact on the quality of the marine or human environment of the Gulf of Mexico. The proposed action is an adjustment of the original regulations of the FMP under the framework procedure set forth in Amendment 1 to rebuild overfished reef fish stocks. The proposed action should not result in impacts significantly different in context or intensity from those described in the environmental impact statement and environmental assessment published with the regulations implementing the FMP and Amendment 1.

Having reviewed the environmental assessment and available information relative to the proposed actions, I have determined that there will be no significant environmental impact resulting from the proposed actions. Accordingly, the preparation of a formal environmental impact statement on these issues is not required for this amendment by Section 102(2)(c) of the National Environmental Policy Act or its implementing regulations.

Approved: _____

Assistant Administrator for Fisheries

Date

12. OTHER APPLICABLE LAW

Habitat Concerns

Reef fish habitats and related concerns were described in the FMP and updated in Amendments 1 and 5. The actions in this regulatory amendment do not affect the habitat.

Vessel Safety Considerations

A determination of vessel safety with regard to compliance with 50 CFR 605.15(b)(3) has been requested from the U.S. Coast Guard. Actions in this regulatory amendment are not expected to affect vessel safety.

Coastal Zone Consistency

Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 requires that all federal activities which directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. The proposed changes in federal regulations governing red snapper in the EEZ of the Gulf of Mexico will make no changes in federal regulations that are inconsistent with either existing or proposed state regulations.

While it is the goal of the Council to have complementary management measures with those of the states, federal and state administrative procedures vary, and regulatory changes are unlikely to be fully instituted at the same time.

This regulatory amendment is consistent with the Coastal Zone Management programs of the states of Alabama, Florida, Louisiana, Mississippi and Texas to the maximum extent possible. This determination has been submitted to the responsible state agencies under Section 307 of the Coastal Zone Management Act administering approved Coastal Zone Management programs in the states of Alabama, Florida, Mississippi, Louisiana and Texas.

Paperwork Reduction Act

The purpose of the Paperwork Reduction Act is to control paperwork requirements imposed on the public by the Federal Government. The authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and record keeping requirements is vested with the Director of the Office of Management and Budget. This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

The Council does not propose, through this regulatory amendment, to establish any reporting requirements or burdens. However, it is not known at this time whether the recreational red snapper quota monitoring program to be developed by NMFS will require additional reporting requirements from the recreational sector.

Federalism

No federalism issues have been identified relative to the actions proposed in this regulatory amendment. Therefore, preparation of a federalism assessment under Executive Order 12612 is not necessary.

13. SCIENTIFIC RESEARCH AND DATA NEEDS

Biological Needs

The Reef Fish Stock Assessment Panel did not identify any additional red snapper research and data needs at their November 1996 meeting. However, The RFSAP and NMFS expressed concerns about the potentially difficult transition period following Dr. Goodyear's retirement, relative to consistency in analytical approach to future red snapper stock assessments. Consequently, the RFSAP recommended that, if it is expected to provide the Council with advice based upon the best available scientific information, especially with regard to review of assessment methodologies and data inputs, a more interactive approach to the stock assessment "process" between the Panel and the NMFS analysts needs to be developed.

The RFSAP and the Council reviewed vermilion snapper and amberjack stock assessments in 1996. Although no framework procedure actions on these species is being proposed in this regulatory amendment, the RFSAP identified the following data and research needs:

VERMILION SNAPPER

1. Use contemporary annual age / length keys to assign ages to lengths in assessments instead of using growth curves.
2. Evaluate alternative methods of stock assessment to the currently used age based method.
3. Evaluate the currently available data to see whether the threshold SPR and proposed OY target of 30% are appropriate for vermilion snapper.
4. Initiate a study of vermilion snapper predator/prey relationships.

AMBERJACK

- 1) Since 1992, MRFSS charterboat estimate of vessels targeting greater amberjack and of successful trips has rapidly decreased. This apparent decrease in effort translates into lower fishing mortality rates and subsequently higher SPR values. However, this conclusion conflicts with testimony from charterboat operators. This conflict between the results of the charterboat data and the observations of charterboat operators should be examined and resolved.
- 2) Further consideration and documentation of the maturation schedule for greater amberjack is warranted, given that the current assessment indicates that all fish are mature by age-2, while not being fully vulnerable to the fishery until age-6 due to size limits currently in place. If fish are not fully mature until they are older, inclusion of the true maturation schedule coupled with current selectivities could significantly affect assessment outcomes.

Socioeconomic Needs

The following scientific research and data needs have been identified by the Socioeconomic Assessment Panel.

1. Demand models associated with this fishery should be estimated using more recent monthly time series data
2. Supply models should be estimated using the results of the completed survey of the commercial reef fishery.
3. Modeling results based on the survey of the commercial reef fishery should be presented at the SEP's next meeting on reef fish.
4. The SEP recommends that an attempt be made to look at species substitution in both the commercial and recreational fisheries.
5. New York wholesale price information should be examined to further investigate price fluctuations and price by market size categories.
6. Social and demographic information on the participants of Gulf of Mexico reef fish fishery.
7. Estimate separate demand models private recreational and for-hire sector.

14. REFERENCES

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15. PUBLIC REVIEW

A public hearing to obtain public comments on the provisions of this regulatory amendment was held during the Gulf Council meeting in November 1995 in New Orleans, Louisiana. Copies of this document may be obtained from the Gulf of Mexico Fishery Management Council office, 5401 West Kennedy Boulevard, Suite 331, Tampa, Florida 33609, (813)228-2815.

LIST OF AGENCIES CONSULTED

Gulf of Mexico Fishery Management Council's

- Reef Fish Stock Assessment Panel
- Socioeconomic Panel
- Standing and Special Reef Fish Scientific and Statistical Committee
- Red Snapper Advisory Panel

National Marine Fisheries Service

- Southeast Regional Office
- Southeast Fisheries Science Center

RESPONSIBLE AGENCY:

Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 331
5401 West Kennedy Boulevard
Tampa, Florida 33609
(813)228-2815

LIST OF PREPARERS

Gulf of Mexico Fishery Management Council

- Steven Atran, Population Dynamics Statistician
- Antonio Lamberte, Economist

Table 118. Estimated probability distributions of SPR in the year 2019 for Gulf of Mexico red snapper for several management alternatives for a post-bycatch natural mortality rate of 0.10 (from Goodyear 1995).

CASE								
P	A	B	C	D	E	F	G	H
0.99	0.122	0.084	0.211	0.195	0.179	0.144	0.105	0.205
0.98	0.122	0.085	0.213	0.197	0.182	0.150	0.112	0.205
0.97	0.122	0.085	0.213	0.198	0.184	0.152	0.119	0.205
0.96	0.122	0.086	0.213	0.198	0.184	0.154	0.120	0.205
0.95	0.122	0.086	0.214	0.198	0.184	0.154	0.122	0.205
0.90	0.122	0.087	0.215	0.200	0.187	0.158	0.127	0.205
0.85	0.122	0.088	0.216	0.201	0.188	0.161	0.132	0.205
0.80	0.122	0.088	0.216	0.202	0.190	0.163	0.136	0.205
0.75	0.122	0.089	0.217	0.203	0.191	0.166	0.140	0.205
0.70	0.122	0.089	0.218	0.204	0.192	0.168	0.143	0.205
0.65	0.122	0.090	0.218	0.205	0.193	0.169	0.145	0.205
0.60	0.122	0.090	0.218	0.205	0.194	0.171	0.147	0.205
0.55	0.122	0.090	0.219	0.206	0.195	0.172	0.150	0.205
0.50	0.122	0.091	0.219	0.207	0.196	0.174	0.152	0.205
0.45	0.122	0.091	0.220	0.207	0.196	0.175	0.154	0.205
0.40	0.122	0.092	0.220	0.208	0.197	0.177	0.156	0.205
0.35	0.122	0.092	0.220	0.209	0.198	0.178	0.157	0.205
0.30	0.122	0.092	0.221	0.209	0.199	0.179	0.160	0.205
0.25	0.122	0.092	0.221	0.210	0.200	0.181	0.162	0.205
0.20	0.122	0.093	0.222	0.210	0.201	0.182	0.163	0.205
0.15	0.122	0.093	0.222	0.211	0.201	0.183	0.166	0.205
0.10	0.122	0.094	0.223	0.212	0.203	0.185	0.168	0.205
0.05	0.122	0.095	0.224	0.213	0.204	0.188	0.173	0.205
0.04	0.122	0.095	0.224	0.214	0.205	0.189	0.174	0.205
0.03	0.122	0.096	0.224	0.214	0.206	0.190	0.175	0.205
0.02	0.122	0.096	0.225	0.215	0.207	0.191	0.177	0.205
0.01	0.122	0.096	0.225	0.216	0.207	0.193	0.179	0.205

Definitions of Cases

- A No harvest, no reduction in shrimp bycatch.
- B 2722 tonne (6 million pound) TAC, no reduction in shrimp bycatch.
- C 2722 (6 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- D 3629 (8 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- E 4536 (10 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- F 5453 (12 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- G 6359 (14 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- H Constant F, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998.

Table 119. Estimated 50th percentile of the probability distribution of SPR by year for Gulf of Mexico red snapper for several management alternatives for a post-bycatch natural mortality rate of 0.10 (from Goodyear 1995).

Year	CASE							
	A	B	C	D	E	F	G	H
1995	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
1996	0.008	0.006	0.006	0.006	0.006	0.006	0.006	0.007
1997	0.011	0.007	0.007	0.006	0.006	0.005	0.005	0.010
1998	0.014	0.008	0.008	0.007	0.007	0.005	0.005	0.012
1999	0.018	0.010	0.010	0.009	0.007	0.006	0.005	0.016
2000	0.023	0.012	0.013	0.011	0.009	0.006	0.005	0.021
2001	0.028	0.015	0.017	0.014	0.011	0.008	0.006	0.027
2002	0.034	0.018	0.022	0.018	0.015	0.010	0.007	0.034
2003	0.041	0.021	0.029	0.024	0.020	0.014	0.009	0.043
2004	0.047	0.025	0.037	0.031	0.026	0.018	0.013	0.053
2005	0.054	0.029	0.047	0.039	0.033	0.024	0.017	0.064
2006	0.060	0.033	0.058	0.049	0.042	0.030	0.022	0.076
2007	0.067	0.037	0.070	0.060	0.052	0.038	0.028	0.088
2008	0.073	0.042	0.083	0.072	0.063	0.048	0.035	0.100
2009	0.079	0.047	0.096	0.084	0.075	0.058	0.043	0.113
2010	0.085	0.051	0.110	0.097	0.087	0.068	0.052	0.125
2011	0.091	0.056	0.123	0.111	0.100	0.080	0.062	0.136
2012	0.096	0.061	0.137	0.124	0.113	0.091	0.072	0.148
2013	0.100	0.066	0.150	0.137	0.125	0.103	0.083	0.158
2014	0.105	0.070	0.163	0.150	0.138	0.116	0.094	0.168
2015	0.109	0.075	0.175	0.162	0.150	0.128	0.106	0.177
2016	0.113	0.079	0.187	0.174	0.162	0.140	0.117	0.185
2017	0.116	0.083	0.199	0.186	0.174	0.151	0.129	0.192
2018	0.119	0.087	0.209	0.197	0.185	0.163	0.140	0.199
2019	0.122	0.091	0.219	0.207	0.196	0.174	0.152	0.205
2020	0.125	0.094	0.229	0.216	0.206	0.184	0.163	0.211

Definitions of Cases

- A No harvest, no reduction in shrimp bycatch.
- B 2722 tonne (6 million pound) TAC, no reduction in shrimp bycatch.
- C 2722 (6 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- D 3629 (8 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- E 4536 (10 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- F 5453 (12 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- G 6359 (14 million pound) TAC, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998
- H Constant F, 5.8% reduction in shrimp bycatch in 1993, 10% in 1994, 24% in 1996, 37% in 1997 and 50% in 1998.

Source: Table 1 from Holiman 1995

ESTIMATED 1996 GULF OF MEXICO RED SNAPPER LANDINGS (MILLIONS OF POUNDS) UNDER DIFFERENTIAL BAG AND SIZE LIMITS.				
HEADBOAT/CHARTERBOAT		PRIVATE/RENTAL		
BAG LIMIT	SIZE LIMIT	BAG LIMIT	SIZE LIMIT	LANDINGS
5	15	5	15	4.469
4	15	4	15	4.014
2	15	5	15	3.681
5	15	2	15	3.526
3	15	3	15	3.453
2	15	4	15	3.426
4	15	2	15	3.325
2	15	3	15	3.122
3	15	2	15	3.068
2	15	2	15	2.737
5	16	5	16	4.008
5	16	4	16	3.780
4	16	4	16	3.600
3	16	5	16	3.600
5	16	3	16	3.509
2	16	5	16	3.300
5	16	2	16	3.164
3	16	3	16	3.098
2	16	4	16	3.072
4	16	2	16	2.984
2	16	3	16	2.800
3	16	2	16	2.753
2	16	2	16	2.456
5	15	5	16	4.226
4	15	4	16	3.798
5	15	3	16	3.727
5	15	2	16	3.382
3	15	3	16	3.269
2	15	4	16	3.210
4	15	2	16	3.182
2	15	3	16	2.939
3	15	2	16	2.925
5	17	5	17	3.392
5	17	4	17	3.201
5	17	3	17	2.973
4	17	3	17	2.819